

# EXHIBIT C

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This invention is being prepared for submission  
to the GE Patent And Legal Operation. Attorney  
work product may be contained herein.  
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## GE Patent Disclosure Letter System

### DOCKET NUMBER

29783

### DOCKET DATE

Thursday, October 11, 2001

### TITLE OF INVENTION

Method and Apparatus for Adjusting the Duration and  
Shape of a High Power Optical Flash

### GE TECHNOLOGY AREA(S)

- Corporate R&D Advanced Technology Programs
- GE Aircraft Engines

### Keywords:

- Controls/Diagnostic (13 DS)
- Electrical Systems (13 DT)
- Laser Business (52 LB)
- GE Industrial Systems

### Keywords:

- Appliance Control (03 AC)
- Accessory Equipment (03 AE)
- Component Capacitor (03 CC)
- Power Delivery (11 DV)
- Switchgear (11 SW)

- Capacitor Products (36 CA)
- GE Lighting

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**Keywords:**

- High Intensity & Quartz Lamp (LD HQ)
- Lighting Systems (LD LS)
- Specialty Products (LD SP)
- GE Medical Systems

**Keywords:**

- MR Magnets 15 MG
- Ultrasound Programs 15 UL
- GE Power Systems

**Keywords:**

- Reuter/Stokes 24 RS
- Advanced Technologies 25 EA

PROJECT NAME

IR for Wall Thickness

PROJECT NUMBER

2130303000

PROJECT LEADER

Ringermacher, Harry, I

BUSINESS OR ORG. CONTACT INFORMATION

**NAME** Tom Bantel

**PHONE NUMBER**

Was this invention first conceived or reduced to practice in  
the performance of work under a contract between GE and  
another non-government third party? NO

**Date Invention Conceived : July 18, 2001**

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**Circumstances Invention Conceived i.e., described in patent notebook (include page #), technical report, letter, discussed in meeting minutes, etc.**  
CRD Patent Notebook, P.31.

**Was this invention first conceived or reduced to practice in the performance of work under a US Government contract?**

NO

**ABSTRACT OF THE INVENTION**

**Please write a brief explanation of the invention (Limit to 350 words)**

The invention "quenches" or cuts the exponential tail off from a decaying light pulse. It utilizes an IGBT(Insulated Gate Bipolar Transistor), invented by GE, to switch off the current powering a high power optical flash lamp.

**BACKGROUND OF THE INVENTION**

**Please describe the problem or requirement addressed by your invention.**

High power flash lamps are used for transient infrared imaging. An ideal flash pulse is rectangular in time, that is, it has a sharp turn-on and sharp turn-off for a desired duration, for example, 2 milliseconds. During that time, it heats the surface of a part to be inspected with the IR flash method. When the pulse turns off, data frames can be acquired by an IR camera observing the surface. A realistic pulse has an exponential tail in its natural decay. The tail goes on for some time - even during the data frame acquisition period, if early frames are demanded, for example if very thin materials are to be evaluated. The presence of the optical tail continues to heat the part - when there should be no more heating in principle - thereby distorting the thermal information in the acquired data in those frames. The invention cuts off the tail at the desired time, thereby eliminating the data distortion and permitting higher analysis accuracy.

**How has this problem or requirement been addressed before?**

This problem has never been addressed before.

**Is this disclosure letter related to any GE disclosure letters, patent applications or issued patents?**

NO

**Have you completed a prior art search? NO**

**Please list any relevant literature or patents of which you are aware.**

**DETAILED DESCRIPTION OF THE INVENTION**

**How does your invention work?**

The IGBT is a high power handling switching device. The

IGBT emitter - collector is in series with the xenon flash-lamp current supply line. The IGBT has a high voltage gate control which is turned on by an appropriate gate voltage. This closes the lamp circuit allowing current to flow to the lamp and the flash to initiate. The end of the gate pulse, adjusted by a delay-generator, opens the circuit, thus cutting off the tail of the pulse at the chosen delay time. This produces a rectangularly shaped optical pulse. The desired pulse duration is equal to the IR camera frame period used for the particular application. For example, if the camera operates at 500 frames per second(FPS), the frame period is 0.002 seconds and the pulse duration should be set to 2 ms plus the appropriate pre-flash duration.

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**Describe the important features of your invention and explain how to use the invention to solve the problems described above.**

The invention could be a discrete component added in-line to the exterior or interior of the power unit driving the lamp.

**What advantages are provided by your invention?**

Any advantage derived from precisely limiting the duration of a high power flash pulse may be included. In particular, the ability to begin recording optical data at a precise time following the flash initiation without the interference of the actual flash tail.

**Has your invention been reduced to practice? YES**

Date: October 5, 2001

**Briefly describe any efforts to make a prototype of your invention or to test your invention. Additionally, summarize the results of any related experiments and testing and highlight any results of particular significance.**

A 1200 Volt, 900 amp IGBT was acquired and wired into the line driving a Speedotron model 206 flashlamp from a Speedotron 4803, 4.8kJ supply. A gate driver was used to apply a 15 Volt delay-adjusted gate signal to the IGBT. The flash was monitored using a high speed photodiode and digital storage scope. The flash data clearly showed variable quenching collateral with the applied gate pulse.

**BRIEF DESCRIPTION OF THE DRAWINGS**

**Please describe the significance of any pictures, drawings, graphs, diagrams, structures or figures and the type of picture along with the specific view or application to the invention.**

Fig. 1 is the circuit and IGBT block diagram. Fig.2 shows the flash with full decay. Fig.3 shows the flash cut off at 20 ms. Fig.4 shows the flash cut off at 10 ms. Fig.5 shows the flash cut off at 5 ms. Fig.6 shows the flash cut off at 2 ms. Fig.7 shows the flash cut off at 1 ms. Fig.6 shows the flash cut off at 2 ms.

**CLAIMED INVENTION**

**Please identify novel aspects that should be protected**